



April 20, 2001

The Honorable Steve Peace, Chair  
Joint Legislative Budget Committee  
State Capitol, Room 3060  
Sacramento, CA 95814

Dear Senator Peace:

Enclosed is the Public Safety Microwave Network: Radio Vault and Tower Consolidation Feasibility Report as required by Supplemental Report Item, 1760-001-0666, #4.

If you have any questions or require additional information, please contact Barry Hemphill, Deputy Director, Telecommunications Division, Department of General Services, at (916) 657-9428.

Very truly yours,

Barry D. Keene, Director  
Department of General Services

BDK:RB:BH:CLS:GG:RH:mm\legislative report vaults & towers 03-05-01.doc

Enclosure

cc: See attached Supplemental Report List #2  
Rosamond Bolden, Chief Deputy Director, Executive Office, Department of General Services  
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**SUPPLEMENTAL REPORT LIST #2**  
**LEGISLATIVE REPORT LISTING**

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Originating Office

**SUPPLEMENTAL REPORT--REVISED 04/30/01**

**Report to the Legislature**  
**Public Safety Microwave Network:**  
**Radio Vault and Tower Consolidation Feasibility Report**

**STATE OF CALIFORNIA**  
**DEPARTMENT OF GENERAL SERVICES**  
**TELECOMMUNICATIONS DIVISION**

**1 April 2001**

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## **1. EXECUTIVE SUMMARY**

## **1.1 SUMMARY**

The Supplemental Report for the 2000 Budget Act, Item 1760-001-0666, #4, requested that the Department of General Services (DGS) provide a report addressing the feasibility of consolidating construction, operation and maintenance of vaults and towers associated with the state's radio systems.

In addition to those issues, this report addresses additional issues that will have to be examined and resolved if consolidation is required:

- The transfer of the responsibility for the state-owned properties and state held leases to a single entity would require a significant effort and additional resources;
- The fiscal impact on federal, local, and private systems would need to be assessed;
- Program governance;
- The impact of a consolidated vault and tower program on the Public-Safety Radio Integrated Systems Management (PRISM) program.

## **1.2 BACKGROUND**

In response to the Supplemental Report for the 2000 Budget Act, Item 1760-001-0666, #4, the DGS, with input from our client agencies, has developed the following feasibility study exploring the issues surrounding the consolidation of construction, operations, and maintenance of the state's radio vault and tower infrastructure. In considering the feasibility of consolidating operations, the scope of this report addresses issues including:

- Renovation and modification of existing public towers and vaults;
- Centralizing construction of new towers and vaults in one agency;
- Centralizing leasing agreements, site acquisition, permits, site licenses, California Environmental Quality Act (CEQA) activities, lease administration, rights-of-way agreements;
- Centralizing responsibility for maintenance and operation of state-owned towers and vaults;
- Centralizing ownership of state-owned towers and vaults; and
- Centralizing vault and tower maintenance in one agency.

The following public service and public safety agencies are users of the state's radio vault and tower infrastructure. Each participated in this study by providing documentation and taking part in focus groups.

- California Highway Patrol (CHP)
- Department of Forestry and Fire Protection (CDF)
- Department of Corrections (CDC)
- California Youth Authority (CYA)
- Department of Fish and Game (DFG)
- Department of General Services Telecommunications Division (DGS-TD)
- Department of Parks and Recreation (DPR)
- Department of Transportation (DOT)
- Office of Emergency Services (OES)
- Department of Water Resources (DWR)
- Department of Justice (DOJ).

In order to assess which sites would be subject to consolidation, each agency was asked to characterize its vault and tower infrastructure with regard to access, primary function, manned facilities, location, and the potential for use by other agencies. Based upon the client agency responses, locations that are exclusively dedicated to non-shared equipment or function do not fall within the scope of this study. For example, rooms used to house communications equipment within larger facilities were not considered suitable for consolidation due to the difficulty in isolating maintenance and support functions.

### 1.3 FINDINGS

Pursuant to the Supplemental Report, the following programmatic requirements and alternatives surrounding consolidation of the state's vault and tower infrastructure were considered:

- **Renovation And Modification Of Existing Towers And Vaults, Both Public And Private** – There are currently no statewide standards that govern the quality of maintenance at existing radio tower and vault facilities. Agencies that own radio infrastructure have taken different approaches to maintenance, reflecting agency maintenance priorities, requirements, and sourcing options. As a result, maintenance at these facilities is conducted in different ways and to varying degrees of quality. For the purpose of planning and budgeting, the DGS-TD anticipates an annual average of 12 minor renovations, repairs, or modifications to the state's vaults and towers over a 10-year period.
- **Construction Of New Vaults And Towers** – The DGS-TD has established general policies regarding the features or characteristics that radio vaults and towers must adhere to for state-owned sites. The decision to construct additional vaults and towers will be based upon the operational needs of the various state agencies and the PRISM program. For the purpose of planning and budgeting, the DGS-TD anticipates an annual average of



seven major site upgrades or new construction of radio communication vaults and towers over a 10-year period, in addition to PRISM's needs.

- **Leasing Agreements, Both Public And Private** – Some state agencies currently maintain a large infrastructure of property in support of their telecommunications needs. Additionally they maintain lease agreements with non state-owned facilities. The transfer of ownership and responsibility of these sites, leases, and agreements would be a large undertaking requiring significant preplanning and coordination between a single state entity, Department of General Services Real-Estate Services Division (DGS-RES), and the user agencies. The considered alternatives include transferring all property ownership and lease management responsibilities to a single state entity and continuing agency control of property ownership and lease management responsibilities.
- **Transfer Of Responsibility For Maintenance And Operation Of State-Owned Towers And Vaults** – In a consolidated environment, a single state entity would be given the mandate of authority and responsibility for all telecommunications sites and their respective facilities considered subject to consolidation. These responsibilities would also include the mandate of authority and responsibility for lease administration of all non state-owned telecommunications sites. The single state entity would furnish complete telecommunications facilities services of site acquisition, site lease management, site facilities engineering design, construction, repair, and maintenance of all consolidated sites. The considered alternatives include establishing a dedicated vault and tower maintenance capability in a single state entity, utilizing existing maintenance capabilities of the user agencies, or outsourcing maintenance activities to a third party vendor.
- **Disposition Of Ownership Of State-Owned Towers And Vaults** – The various state agencies maintain a large infrastructure of both manned facilities utilizing radio equipment (typically dispatch centers, district offices, correctional facilities, etc.) and dedicated remote radio vaults and towers. Locations exclusively dedicated to non-shared equipment or function do not fall within the scope of this study. Rooms used to house communication equipment within larger facilities were not considered suitable for consolidation due to the difficulty in isolating maintenance and support functions. For those towers and vaults that meet the consolidation criteria the transfer must be done in a manner that does not create an economic or staff burden. The transfer should be done on a schedule that is in line with the program's resources.
- **Functionality** – The state's vault and tower infrastructure is used to support public safety and public service communications throughout the state. Vaults are used to house telecommunications equipment for voice radio systems and the state's Public Safety Microwave Network (PSMN) in an environmentally controlled and secure surrounding. This setting includes both primary and backup power systems depending upon the criticality of the site. Towers are used to support antennas for these systems.
- **Service Levels** – In a consolidated environment, the level of service provided to the client agencies must be sufficient for those agencies to meet their public safety and public

service responsibilities. In no case should it be less than what the agencies are currently experiencing. These service levels should support the current level of service the DGS-TD supplies in the maintenance of the radio systems for the agencies. Additionally, a mechanism for prioritizing requests for service should be established. The considered alternatives include providing radio tower and vault service in support of current and future written radio system Service Level Agreements (SLA) and providing radio tower and vault service levels as prioritized in the governance process.

- **Impact To Federal, Local And Private Systems** – Presently, the agencies currently absorb much of the program cost and do not bill for the full cost of operating and maintaining the towers and vaults. Thus, we have determined that the cost impact to federal, local, or private systems within state vaults that occur as a result of consolidation will need to be addressed. Prior to consolidation, a detailed review and analysis should be performed of all outstanding interoperability agreements between the state and potentially affected agencies for the purpose of identifying operational needs and requirements.
- **Security** – The security capabilities currently available at state-owned facilities vary considerably depending on the managing agency, type of site, location of site, history of site, etc. Security characteristics range from minimal security (vault door locks) to significant security enhancements such as secured fencing and remote security alarms. While some agencies such as the California Youth Authority and the Department of Corrections have extremely stringent requirements, other sites do not require similar guidelines. Specific security requirements for sites will need to be addressed on a site-by-site basis.
- **Program Governance** – The governance model chosen for the consolidation program will be critical to its success. Regardless of the model chosen, the processes and procedures must provide the authority, flexibility, and structure to meet the needs of the user agencies and the public they serve. Central to any governance model are clearly defined leadership authority, management responsibilities, and decision-making processes. The considered alternatives include managing program governance by the DGS-TD and establishing an advisory committee.
- **Coordination With PRISM** – The Public-Safety Radio Integrated System Management Program (PRISM) program is tasked with the forward planning and ultimate implementation of a statewide interoperable, multijurisdictional, multifunctional digital wireless communications infrastructure able to accommodate all state public safety and public service agency wireless communications needs. To support this communications infrastructure, the PRISM program anticipates that many new and existing vault and tower sites will be required. The considered alternatives, from the perspective of the PRISM program, include treating PRISM as a separate client agency in a consolidated environment and continuing individual agency control of vaults and towers without consolidation.

- **Implementation Schedule** – The selected timing of implementation will affect the ability of the DGS-TD and the client agencies to obtain sufficient resources necessary to transfer responsibility without interruption of service. The considered alternatives are predicated on the requirement that there be no interruption in service and that sufficient resources are obtained by all affected stakeholders. The considered alternatives include transferring all affected sites to the DGS-TD ownership or control on a predetermined date and implementing a phased migration schedule.
- **Funding** – This will be a fee for service with money going into the Service Revolving Fund.

## 2. INTRODUCTION

## **2.1 BACKGROUND**

In response to the Supplemental Report for the 2000 Budget Act, Item 1760-001-0666, #4, the DGS-TD in conjunction with client agencies have developed the following feasibility study exploring the issues surrounding the consolidation of construction, operation, and maintenance of the state's radio vaults and towers infrastructure. In considering the feasibility of consolidating operations, the scope of this report addresses issues including:

- Renovation and modification of existing public towers and vaults;
- Construction of new towers and vaults;
- Leasing agreements, site acquisition, permits, site licenses, California Environmental Quality Act (CEQA) activities, lease administration, rights-of-way agreements;
- Transfer of responsibility for maintenance and operation of state-owned towers and vaults;
- Disposition of ownership of state-owned towers and vaults; and
- Centralizing vault and tower maintenance in one agency.

The Legislature has requested a report that looks at the feasibility of consolidating operation, construction and maintenance of all state-owned towers and vaults. Part of the feasibility study is to determine if all costs should be recovered in the telecommunications rate structure. This study addresses the feasibility of a program where maintenance and operations costs are recovered on an annual basis from client agencies via vault user operation and maintenance rates. This study also addresses future vault and tower capital outlay project costs, which will be centralized in the DGS and funded from the sinking fund through user agency surcharges on a rational basis. The scope of the report intends that state public safety agencies remain responsible for their end user equipment such as the two-way radios for which they maintain responsibility and any equipment in the vaults or on the towers that have no potential for being used by other agencies.

For the purpose of this analysis, shared equipment has been defined as the buildings, vaults and towers that are for the exclusive use of telecommunications functions. This includes equipment that is dedicated and integral to the building, vault and tower complex. Examples are racks, batteries, chargers, low voltage disconnect panels, antenna combining systems, HVAC (Heating Ventilation and Air Conditioning) and stand-by power systems. Although not strictly shared, but included as systems that provide a subscription type of service, are CMARS (California Multi-Agency Radio System) and the PSMN.

Non-shared equipment has been defined as agency dedicated terminal equipment. Examples include telemetry stations, Closed Circuit Television (CCTV) equipment, ramp monitoring equipment, batteries and chargers dedicated to an individual base station or repeater, two-way radio base stations, repeaters, consoles, antennas and logging recorders.

In order to assess which sites would be subject to consolidation, each agency was asked to characterize its vault and tower infrastructure with regard to access, primary function, manned facilities, location, and the potential for use by other agencies. Based upon the client agency responses, locations that are exclusively dedicated to non-shared equipment or function do not fall within the scope of this study. For example, rooms used to house communications equipment within larger facilities (e.g., dispatch centers, correctional facilities) were not considered suitable for consolidation due to the difficulty in isolating maintenance and support functions. For the purpose of this report, it was left to the discretion of each agency to make a final determination regarding individual site consolidation.

## **2.2 AGENCY OVERVIEW**

The following public service and public safety agencies are users of the state's radio vault and tower infrastructure. Each participated in this study by providing documentation and taking part in focus groups. A brief overview of each agency is provided:

### **2.2.1 California Highway Patrol (CHP)**

The CHP is the state's law enforcement agency responsible for the safe, convenient, and efficient transportation of people and goods across California's highway system. The CHP has Telecommunications Facilities Technicians that maintain the CHP facilities. The CHP is the only agency that runs its own dedicated facility maintenance shops.

### **2.2.2 Department of Forestry and Fire Protection (CDF)**

The CDF is dedicated to the fire protection and stewardship of over 31 million acres of California's privately-owned wildlands and various emergency services in 33 of the state's 58 counties via contract with local governments. Currently, technical services staff performs maintenance on vaults and towers during periods of low activity.

### **2.2.3 Department of Corrections (CDC)**

The CDC operates all state prisons, oversees a variety of community correctional facilities, and supervises all parolees during their re-entry into society. The CDC currently controls a total of 33 separate institutions. All CDC telecommunications equipment is located within these institutions. Specifically, most vaults are parts of larger warehouses on facility grounds. Furthermore, all radio equipment maintenance for the CDC is provided by the DGS-TD. There are no dedicated maintenance crews for vaults and towers.

### **2.2.4 California Youth Authority (CYA)**

The CYA provides institutional training and parole supervision for juvenile and young adult offenders. As part of the state's criminal justice system, the CYA works closely with law enforcement, the courts, prosecutors, probation, and a broad spectrum of public and private

agencies concerned with and involved in the problems of youth. The CYA currently uses trunked 800 MHz and VHF/UHF radio systems. There are no dedicated maintenance crews for vaults and towers.

### **2.2.5 Department of Fish and Game (DFG)**

The DFG is responsible for the protection of California's diverse fish, wildlife and plant resources, and the habitats upon which they depend for their ecological values and use and enjoyment by the public. The agency utilizes radio primarily for emergency enforcement, vessel inspections, and the coordination of responses to oil or hazardous waste spills. There are no dedicated maintenance crews for vaults and towers.

### **2.2.6 Department of General Services Telecommunications Division (DGS-TD)**

The DGS-TD develops and implements policies, standards, practices, and procedures for economic and efficient development of state telecommunications facilities. The division provides services to all state agencies for radio, telephone, teletype, microwave, Closed Circuit Television (CCTV), emergency telephone program, data transmission, and any special telecommunications facilities. Service includes consulting, planning, engineering, installing, maintenance, specifications, Federal Communications Commission license applications, equipment evaluation, special studies, and management of state telecommunication facilities and equipment. The DGS-TD facilities maintenance personnel perform tower and vault maintenance.

### **2.2.7 Department of Parks and Recreation (DPR)**

The mission of the DPR is to preserve and protect natural and cultural resources for the state. Currently, the DPR owns approximately 14 sites with improved towers and vaults and approximately four Public Safety Answering Point (PSAP) sites with improved towers and vaults. The DPR also owns several other minor dispatch centers throughout the state. Tower and vault maintenance is performed by general maintenance personnel as well as by some CHP maintenance personnel.

### **2.2.8 Department of Transportation (DOT)**

The DOT constructs, operates, and maintains a comprehensive transportation system of more than 15,200 miles of highways and freeways within California. Responsibilities of the DOT's Telecom staff include acquiring lease agreements, contracting and procuring sites, maintaining sites and roads, cleaning up hazardous materials and managing facilities and maintenance personnel. The DOT manages its own vaults and towers using non-dedicated maintenance personnel.

### **2.2.9 Office of Emergency Services (OES)**

The OES coordinates the overall state agency response to major disasters in support of local government. The OES is responsible for ensuring the state's readiness to respond to and recover from natural, manmade, and war-caused emergencies, and for assisting local governments in their emergency preparedness, response and recovery efforts. In addition, the OES serves as California's fire-fighting reserve by providing extra vehicles for local agencies to use during emergencies. The OES maintenance staff currently attends to building and grounds maintenance.

### **2.2.10 Department of Water Resources (DWR)**

The DWR maintains a staff of 2,600 personnel statewide and is primarily responsible for the delivery of water and power throughout California. The agency is also responsible for protecting life and property during flood emergencies. To support this mission, the DWR maintains 150 local, state, and federal telemetry sites statewide. Most of these sites are shared with CDF and are predominantly used to measure rainfall, water content in snow, and wind during the winter to predict reservoir levels. The DWR does not perform vault or tower maintenance at any of its sites.

### **2.2.11 Department of Justice (DOJ)**

The DOJ does not own any towers or vaults, but maintains nine regional offices that have base station capabilities. The agency leases space from public and private providers on 17 high elevation towers and approximately 14 low elevation towers. The DOJ compartmentalizes radio coverage to reuse its two frequency pairs. The DOJ does not perform vault or tower maintenance at any of its sites.



### **3. BASELINE ANALYSIS**

The purpose of this section is to provide a clear understanding of the management practices related to the State of California's radio towers and vaults. The existing management practices will serve as a "Baseline" against which the consolidation of the state's towers and vaults can be measured. This Baseline Analysis outlines the organizational structure, roles and capabilities of the DGS-TD and the DGS-RESO; reviews the impact of the PRISM program; summarizes the current statutory provisions as well as the maintenance, operations and funding processes that have evolved over time; and defines the current technical environment, including technical infrastructure, ownership of radio towers and vaults, and existing lease agreements.

### **3.1 DEPARTMENT OF GENERAL SERVICES TELECOMMUNICATIONS DIVISION (DGS-TD)**

Regardless of the eventual disposition of ownership for the state's radio towers and vaults, the role of the DGS-TD as a provider of telecommunications services will remain as is. Consequently, a review of the organization's structure, capabilities and staffing is important to a complete understanding of the current environment.

#### **3.1.1 DGS-TD Telecommunication Capabilities and Responsibilities**

In the event of a decision to consolidate the state's radio vaults and towers, the DGS-TD would be responsible for the transition and long-term operation of the consolidated vault and tower program. Therefore, a closer examination of the current roles and responsibilities of that office are provided.

The DGS-TD designs, installs, licenses, and maintains Public Safety Radio Systems for state, federal, and local government agencies involved in the protection of life and property for the citizens of California. The office serves numerous state organizations, including the following ten major public safety agencies: the Departments of Water Resources, Transportation, Forestry and Fire Protection, Parks and Recreation, Fish and Game, Justice, Corrections, Youth Authority, California Highway Patrol and the Governor's Office of Emergency Services. Additional clients include the Federal Bureau of Investigation, U.S. Coast Guard, and the National Weather Service as well as several California cities and counties.

The DGS-TD provides engineering, maintenance, and administrative services to California state agencies. Duties range from complete system design and augmentation to installation and maintenance. Other services provided are: frequency coordination, procurement, specification development & compliance, vault space management, microwave service, 9-1-1 service and telephone services. The following services are provided by the DGS-TD:

- **Client Representation** – The DGS-TD assigns a client representative to each agency in order to maintain a single point of contact for all correspondence. The client representatives work closely with each agency in order to understand the agency's communication needs and expectations.

- **Project Management** – Once an understanding of a particular need is obtained, an agreement is signed, which details the scope, cost, and timeframe of the related project. Implementation of the work then begins with project management provided by the DGS-TD. The DGS-TD provides project management services for the full lifecycle of a project, including project planning and feasibility studies through resource allocation and management and implementation.
- **Program Management** – The DGS-TD provides program management for several programs. These include the PSMN and the 911 programs. The program management differs from project management mainly in that programs are on-going and projects have a definite start and stop date.
- **System Design and Engineering** – The DGS-TD engineering team provides system design services and is familiar with existing agency communication systems. Telecommunications engineers have specific experiences with the following systems:
  - Conventional
  - Trunked
  - Simulcast
  - Microwave
  - Ground Based Satellite
  - Mobile Communication Vans
  - Dispatch Centers
  - DC Power Systems
  - Vault and tower operational standards and requirements.The DGS-TD engineering also provides special services such as:
  - Vault & Tower Installation
  - Feasibility Studies
  - Radio Surveying
  - Radio Interference Investigations
  - Electromagnetic Interference investigation (Human Exposure to EM Fields)
  - Telecommunications site planning and design
  - Telecommunications site construction
  - Telecommunications site construction oversight.
- **Frequency Coordination and Licensing** – The DGS-TD ensures that each agency's communications system(s) complies with federal regulations by submitting license applications to the Federal Communications Commission (FCC). This also includes submitting license information to regulatory committees (frequency coordinators) for

review and concurrence. In addition, the DGS-TD lobbies regulatory committees and the FCC to promote and defend the needs of state agencies.

- **Vault & Tower Installation and Management, Lease Agreements** – The DGS-TD installs agency-owned equipment, vaults and antenna towers. These facilities can be installed on state, federal or private property. Once installed, the DGS-TD can also provide facility management services with respect to tenant leasing and technical standards. Additionally, the DGS-TD processes interagency vault-lease agreements and provides information for DGS-RESA applications.
- **Procurement, Specification Development and Compliance Testing** – The DGS-TD also assists in the purchasing of new equipment. Once an equipment need is defined with the client agency, the DGS-TD will provide the necessary information to the DGS Procurement Division. Requests for Bid (RFB) will then be issued and the associated equipment purchased. The equipment is then received at the DGS-TD for compliance testing and warehouse storage. The DGS-TD can also develop a customized equipment specification that meets the agency's unique needs. Once the equipment is received, it is tested in the DGS-TD's testing facility to ensure compliance with the specification.
- **Customized Equipment** – The DGS-TD designs and manufactures products to meet unique applications for which there is no commercially available solution. These products include audio and logic interface units, power distribution panels and special hardware such as antenna mounting brackets. Other work has included fitting out special communications vehicles, and the design and fabrication of special data stations.
- **Microwave Subscriber Service** – The DGS-TD owns and operates the PSMN. Consisting of over 260 physical sites and 300 microwave paths, the PSMN carries over 1,300 circuits serving state, federal, and county agencies. The PSMN is an integrated network capable of both voice and data communications. The PSMN also serves as an emergency telephone system and provides the transfer information between remote field facilities and centralized data collection equipment.
- **Equipment Repair** – Although much equipment is repaired in the field by the DGS-TD technicians, some advanced technology equipment requires specialized instrumentation and skills. To meet this repair need, the DGS-TD has developed a high technology repair center. Located in Sacramento the repair center has the equipment and personnel to repair advanced communication equipment.
- **Installation and Maintenance** – The DGS-TD maintains six installation crews that perform major telecommunications installations throughout the state. Once a system is installed, the associated equipment is routinely serviced under the DGS-TD's maintenance program. The DGS-TD has 67 radio maintenance shops located throughout the state. These maintenance shops service the state according to predefined geographic areas depicted in Figure 1.

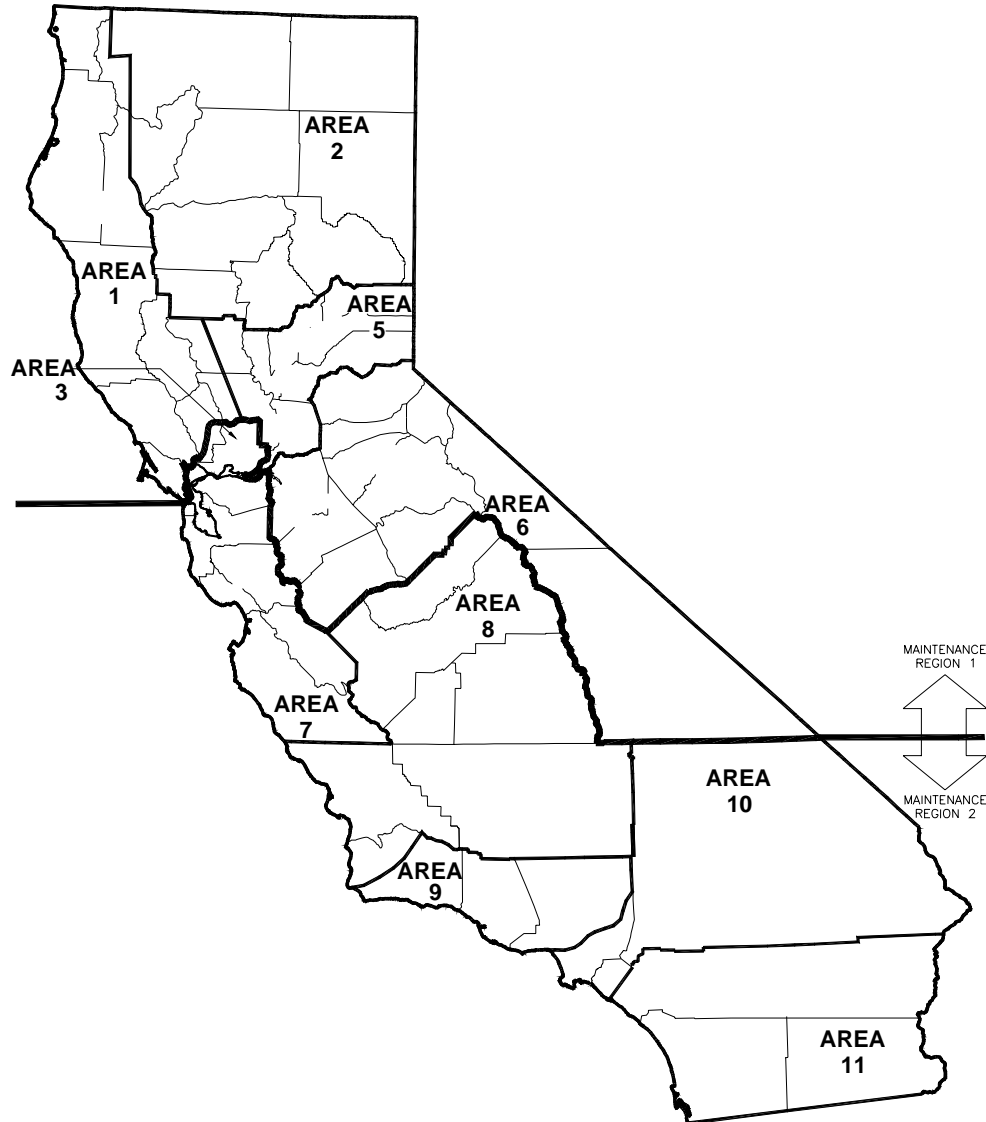


Figure 1. DGS-TD Maintenance Areas

### **3.2 DEPARTMENT OF GENERAL SERVICES-REAL ESTATE SERVICES DIVISION (DGS-RES)**

The DGS-RES provides comprehensive real estate services to all state agencies except the DOT, the DFG, the DWR, the California State University, and the University of California. The DGS-RES conducts asset planning, property sales and acquisition, project management, architectural and engineering services, leasing and planning, property management and building maintenance, construction management, energy efficiency and supply programs, and environmental assessments. This includes the authority to develop and execute lease agreements, as both lessor and lessee, for state agencies with regard to telecommunications space requirements in radio vaults and towers.

### **3.3 PUBLIC-SAFETY RADIO INTEGRATED SYSTEM MANAGEMENT (PRISM) PROGRAM**

The PRISM Program is a telecommunications initiative to establish an interoperable, multi-jurisdictional, multi-agency, shared, public safety digital radio communications network that will provide reliable coverage to public safety agencies throughout the state. Proposed criteria to be observed in the implementation of this shared, statewide, public safety digital radio communications network infrastructure include:

- Hybrid voice and data networks to meet geographic and operational needs;
- System design and optimization to meet agency-unique operational requirements;
- Use of digital technologies for improved operational capabilities, security and spectrum efficiency;
- Operation in multiple spectrum bands, utilizing modern switching technologies, to maximize cost effectiveness and operations;
- Use of existing facilities and equipment to the maximum extent possible, reducing overall costs; and
- Current estimates reveal that a significant number of transceiver sites will be required to support this much improved, statewide public safety multi-agency radio communications infrastructure. This constitutes a significant increase from the number of transceiver sites currently in use by the state.

### **3.4 CURRENT PRACTICES**

The current radio tower and vault practices are a result of both the real authority (as stipulated in Government Code 15850) and the practices that have evolved to meet specific agency needs. As a result, there are few common standards for construction, maintenance, leasing practices, or funding for radio tower and vault infrastructure within the state. Though state agencies lease space for antennas and radio equipment from outside agencies and commercial providers, there is a general division among those state agencies who own their own infrastructure and those agencies who do not. As would be expected, agencies that currently own and maintain vaults

and towers are those with the greatest requirements for radio communications. Specifically, of the 11 departments examined within the scope of this study, the following agencies have constructed and continue to maintain a significant radio tower and vault infrastructure that should be considered within the scope of this consolidation study:

- Highway Patrol;
- Department of Forestry and Fire Protection;
- Department of Transportation;
- Department of Parks and Recreation;
- Department of General Services; and
- Department of Corrections.

Of the 11 departments examined within the scope of this study, the following agencies have not constructed nor maintain a significant radio tower and vault infrastructure, and depend primarily on lease space arrangements to meet their telecommunications infrastructure needs:

- Department of Justice;
- Department of Water Resources;
- Youth Authority;
- Office of Emergency Services; and
- Department of Fish and Game.

### **3.4.1 DGS-TD Legislative Authority and Management Responsibilities**

The DGS-TD has the legislative authority and responsibility to provide the vast majority of technical support services necessary to meet the radio communications operational requirements of state agencies and departments. Statutory authority herein described has been created to address major policy for the state's telecommunications systems and services. The program includes, but is not limited to, acquisition and operation of state communications systems and facilities; establishing policies, standards, practices, and procedures for managing telecommunications systems and services; and developing strategic and tactical policies and plans for statewide telecommunications.

The intent of this program is to ensure that statewide telecommunications management is timely, cost-effective, and efficient. It also ensures that the specialized telecommunications needs of public safety are met. This is accomplished through policies that maximize the state's resources and direct the consolidation and joint use of telecommunications systems and services where it makes economic, programmatic, and technical sense to do so.<sup>1</sup> The Telecommunications Division's role in support of this program is defined in the State Administrative Manual (SAM),

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<sup>1</sup> SAM Section 4500, Program Summary, Resources, And Contacts

General Policy Section 4500, dated February 1993. The Telecommunications Division's responsibilities include:

- Ensure the state agencies have wireless and other telecommunications services necessary to meet their operational needs; and
- Direct the consolidation and joint use of wireless and other telecommunications system resources used by state agencies.

Specifically, the Government Code addresses the statutory authority of the DGS-TD with regards to the state's telecommunications infrastructure:

- Government Code Section 14931 authorizes the DGS-TD to acquire, install, equip, maintain, and operate new or existing communications systems and facilities;
- Government Code Sections 15250-15254 authorizes the DGS-TD to direct the consolidation and joint use of telecommunications system resources used by state agencies;
- Government Code Sections 15275-15277 authorizes the DGS-TD to:
  - Establish policies, standards, practices, and procedures that ensure the orderly and cost-effective development of the state's systems and services;
  - Assess the overall long-range telecommunications needs and requirements of the state and develop strategic and tactical policies and plans for telecommunications;
  - Provide management oversight and coordination of telecommunications systems and services used by the state;
  - Conduct research and demonstration projects pertaining to all facets of telecommunications systems and services; and
  - Monitor and participate on behalf of the state in proceedings of state and federal regulatory agencies, and in congressional and legislative deliberations pertaining to telecommunications.
- SAM Section 4535 states that the DGS-TD is responsible for developing uniform cable and wire distribution standards in state buildings, controlling access to the DGS-TD operated telecommunications equipment rooms, managing radio vault occupancy, and acquiring telecommunications sites.

### **3.4.2 State Agency Management Responsibilities**

State agencies and departments are also governed by SAM Section 4510, which states "state agencies are responsible for managing telecommunications in a cost-effective, efficient manner in accordance with the policies, directives, and procedures established in SAM and the State Telecommunications Management Manual (STMM)." Specifically, the Government Code addresses the statutory authority of the agencies with regards to the state's telecommunications infrastructure:



- Ensure that systems and services are efficiently used to support agency programs;
- Assess and plan for agency telecommunications needs and communicate those needs to the DGS-TD;
- Ensure that projects requiring the DGS-TD involvement are made known during the earliest planning stages;
- Work with the DGS-TD to ensure sufficient project funding;
- Establish policies and controls within the agency related to agency use of telecommunications. This should include, at a minimum, policies on system and service acquisition, state telephone usage, personal use of state telephones, system security including monitoring for fraud and abuse, and payment for services including auditing and correcting invoices. Make certain that these policies and controls are communicated to all agency employees;
- Establish a telecommunications management function within the agency. This function is responsible for representing the organization in telecommunications matters. Provide DGS-TD with the name of the person designated as the primary contact for the agency; and
- Additionally, agencies may request delegated project approval authority for telecommunications services pursuant to the SAM Section 4545. Delegation parameters and procedures for filing delegation requests are found in the STMM.

### **3.4.3 Property Acquisition Law<sup>2</sup>**

According to Government Code Section 15853, the Public Works Board (PWB) may select and acquire, in the name of and on the behalf of the state, with the consent of the state agency concerned, the fee or any lesser right or interest in any real property necessary for any state purpose or function. The DGS-RESA acts as staff to the PWB for acquisition activities. Government Code Section 15853 applies to all state agencies, except the DOT, the DWR, the State Reclamation Board, the DFG, the Wildlife Conservation Board, the Public Employee's Retirement System, the State Teachers' Retirement System, the Department of Housing and Community Development, and the State Lands Commission.

The DGS has lease authority in California Code 14671 to represent other state agencies in situations where the state is landlord (when the state owns the property) or in lease arrangements where the state is a tenant. Specifically, as landlord, Government Code Section 14671 states that the "Director of General Services, with the consent of the state agency concerned, may let for any period of time any real or personal property which belongs to the state, for radio or television purposes where he deems such letting is in the best interests of the state". As tenant,

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<sup>2</sup> Government Code Sections 15850-15853 and 14660-14671 outlines the duties, powers, and responsibilities of state agencies regarding property acquisition law and provides the framework for the DGS-RESA's legislative authority to manage and execute leases for radio vault and tower space requirements.

Government Code Section 14669 states that the “Director may hire, lease, lease-purchase, or lease with the option to purchase any real or personal property for the use of any state agency, including the Department of General Services, if he or she deems the building or leasing is in the best interests of the state.”

#### **3.4.4 California Environmental Quality Act (CEQA)**

The CEQA was enacted in 1970 to safeguard the state’s environment from land-use development and management decisions by requiring state and local governments to consider the environmental impact of a project prior to its approval. The basic goal of CEQA is to develop and maintain a high-quality environment by requiring a careful review process for “projects” that are to be undertaken or require approval from state and local government agencies.

“Project” as defined by the statute is an activity which may cause either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment and which is any of the following:

- An activity directly undertaken by any public agency;
- An activity undertaken by a person which is supported, in whole or in part, through contracts, grants, subsidies, loans, or other forms of assistance from one or more public agencies; and
- An activity that involves the issuance to a person of a lease, permit, license, certificate, or other entitlement for use by one or more public agencies.

Through a careful, multi-phase review process, the CEQA aims to protect the environment by requiring California’s public agencies to:

- Identify the significant environmental effects of their actions; and, either;
- Avoid those significant environmental effect, where feasible; or
- Mitigate those significant environmental effects, where feasible.

The DGS-RESA assists agencies in complying with the environmental review process outlined in the CEQA. In general, the DGS-RESA has worked cooperatively with other agencies so the environmental review process has been successfully followed and has led to no detrimental impact on the environment.

It is not anticipated that the consolidation of California’s vaults and towers will result in additional environmental review as required by the CEQA. It is likely that a statewide exemption will be filed as a categorical exemption to legally transfer ownership and avoid potential future disputes. Because the DGS-TD currently serves as the lead agency prior to construction of most vaults and towers, it is also not anticipated that there will be a major change in the environmental review process for these facilities with respect to resources.

It is the opinion of the DGS-RESA that the consolidation of vaults and towers would have a positive impact with respect to the CEQA in that it would designate one agency as the lead for all vault and tower construction at new sites and large-scale improvements to existing sites. Consolidation would also specifically eliminate problems associated with miscommunication and overlapping efforts between agencies when bidding on the purchase of new sites. Finally, consolidation would establish a single point of contact for accountability with respect to environmental review.

### **3.4.5 Radio Vault and Tower Maintenance Practices**

There are currently no statewide standards that govern frequency, type, response priorities, or the quality of maintenance at existing radio tower and vault facilities. Agencies that own radio infrastructure have taken different approaches to maintenance, reflecting agency maintenance priorities, requirements, and sourcing options. As a result, maintenance at these facilities is conducted in several different ways and to varying degrees of quality. Consolidation may require support of common maintenance standards established by the governing authority. In general, the following practices are common among the state agencies that own or maintain radio sites:

- Contract with private contractors to regularly maintain and service agency towers and vaults; and
- Utilize existing agency program or support staff, depending on availability, to maintain and service agency towers and vaults.

### **3.4.6 Radio Vault and Tower Construction Requirements**

The DGS-TD has established general policies regarding the features or characteristics that radio vaults and towers must adhere to for state-owned sites. Though no specific requirements have been defined, the following policies outline the DGS-TD practices:

- **Regulatory Policies** – The DGS-TD ensures compliance with FCC and other government regulations. In addition, the DGS-TD attempts to resolve interference between radio system users at a vault site.
- **Uniform Standards** – Due to the increasing sophistication and diversity of telecommunications devices within the radio vault and tower infrastructure, the DGS-TD develops and establishes standards for use across the state's infrastructure. By broadly applying uniform standards, the DGS-TD helps to ensure that individual agency needs are met on a consistent basis.
- **Equipment Room Security** – Equipment room security is essential for two reasons. First, the critical nature of the business conducted at these sites. Second, state buildings are designed for an extended useful life. Floor space in these buildings is allocated sparingly; therefore, it is essential for agencies to also effectively manage equipment

room space and comply with tenant telecommunications requirements for these rooms. This requires controlled access and managed security.

- **Leasing Requirements** – State agencies operate telecommunications radio equipment at radio sites statewide. These sites may be leased from non-state entities or owned by the state. The DGS-TD is responsible for the technical review of permits and leases to rent space for telecommunications equipment installations in these state and non state-owned facilities. When an agency leases a site, the lease must be negotiated to allow use of the site by other state agencies without added cost and be acquired in the name of the State of California. The request must be coordinated with the DGS-TD to ensure that the site is adequate for present and future development for all state agencies. The DGS-RESO processes the negotiation of the leases.

### 3.4.7 Other Services

As with maintenance practices, there are currently no statewide standards that govern frequency, type, or the quality of services to existing radio tower and vault facilities. Outside of the minimal construction standards mentioned previously, there are few policies or requirements for the construction of radio vaults and towers. However, depending on the individual radio site, other capabilities and features have been provided by lessor and lessees to meet specific needs. The following capabilities have been identified as common features that would likely require common standards under consolidation:

- **Emergency Power Requirements** – Many radio sites require emergency power capability due to the critical nature of the telecommunications served by the site or the remote location of the site. The emergency power generation equipment located at these sites utilizes a variety of fuel sources, battery plant equipment, commercial A/C power, and uninterruptible power supplies (UPS).
- **Facility Security** – Though the DGS-TD has outlined general security principles, the security capabilities currently available at state-owned facilities vary considerably depending on the managing agency, type of site, location of site, history of site, etc. Security characteristics range from minimal security (vault door locks) to significant security enhancements such as secured fencing and remote security alarms.
- **Other Services** – In addition to power requirements and facility security, other services such as pest control, heating, ventilation and air-conditioning (HVAC), road access, etc., are also available or unavailable depending on particular radio site characteristics. In the case of HVAC systems, equipment requirements and budgetary considerations have affected installation of these systems at qualified sites.

### 3.4.8 Funding Practices

The DGS-TD and other state agencies have utilized a variety of different methods and sources to fund and support telecommunications infrastructure such as radio towers and vaults. The following summary outlines those practices that have been most common among state agencies.

#### ***3.4.8.1 Construction Funding Practices***

The construction of new radio tower and vault sites is typically the last option that an agency pursues in order to supplement its telecommunications infrastructure. Once a need has been identified, the first option that is usually explored is the availability of space within a suitable state-owned facility. This common practice is confirmed by the relatively large number of co-utilized tower and vault facilities identified in the radio survey conducted as part of this study. If a suitable state site is not available, the second option is typically to identify any other sites that may be suitable to the agency's requirements, whether those sites are locally, federally or privately owned facilities. If neither the first nor second option is viable, the last consideration has generally been to construct a new site.

#### ***3.4.8.2 Maintenance Funding Practices***

Departments must generally use existing budget funds or request new funding to support the maintenance of existing sites. This includes funding for maintenance materials as well as funding to support positions to conduct maintenance. Some departments also make use of revenue produced from lease agreements and other reciprocal contracts to fund or "barter" for maintenance funding and services.

#### ***3.4.8.3 Lease Funding Practices***

As previously noted, state agencies enter into lease arrangements for ground space to construct radio towers and vaults and space within existing radio towers and vaults both as lessees and lessor. Where the agency is a lessee, lease funding for the leasing agency is acquired. Funding for leases is accomplished in much the same manner as funding for maintenance. Where the agency is a lessor, lease revenues are generated through contracts with public and private agencies to lease space at lessor sites.

#### ***3.4.8.4 Rights-of-Way***

Rights-of-way refer to the guaranteed access to a radio site by a particular agency. This can be a very important right, since in many cases radio sites have been built on another entity's property or are situated on state-owned property, but surrounded by another entity's property. The DGS-RESA estimates that guaranteed access could be as little as 50 percent.

#### ***3.4.8.5 Lease and Space Agreements***

The DGS-RESA, with the DGS-TD telecommunications engineering concurrence, is responsible for executing fair market agreements for the lease of space on state-owned and privately owned radio sites. In executing this duty the DGS-RESA has developed approximately fourteen separate model contracts for this purpose. These contracts cover both instances in which the state is landlord of radio sites and those instances in which the state is a lessee of another public or private radio site. As previously noted, the DOT, the DWR, the DFG, the California State University, and the University of California have statutory authority to conduct leases for real property, to include radio telecommunications sites. However, the DGS-RESA maintains approval authority for the DWR and the DFG lease arrangements.

#### **3.4.8.6 Good Will to Agency**

It is important to note that many of the departments included in this study have a long history of owning and managing their own radio vaults and towers. This history is manifest in the “good will” that these agencies have developed over time with constituents that live, work, and have interests in those areas where radio vaults and towers have been constructed. In particular, the DPR and the CDF, given the often rural and wildlands remote radio site locations that have been developed, have established working relationships and credibility that consolidation may threaten.

#### **3.4.8.7 Retention of Lease Funds (statutory authority)**

Several agencies have statutory authority to retain lease funds from radio vault and tower infrastructure. In general, these agencies are Special Fund agencies (they receive funding from sources other than the General Fund), though this is not a strict correlation. Departments with statutory authority to maintain lease revenue include the DOT, the DFG, and the DPR, which have limited authority. The CDF, which is a General Fund department, retains 50 percent of revenue that is generated from commercial renters and 100 percent from state agencies.

### **3.5 EXISTING INFRASTRUCTURE**

#### **3.5.1 Infrastructure Definition**

##### **3.5.1.1 Shared Equipment**

For the purpose of this feasibility study, shared equipment is defined as the buildings, vaults and towers that are used for the exclusive use of telecommunications functions. This includes equipment that is dedicated and integral to the building, vault and tower complex. Examples are racks, batteries, chargers, low voltage disconnect panels, antenna combining systems, HVAC, and emergency power systems. Although not strictly shared, but included as systems that provide a subscription type service are California Multi-Agency Radio System (CMARS) and the PSMN.

##### **3.5.1.2 Non-shared Equipment**

Non-shared equipment is defined as agency dedicated terminal equipment. Examples are telemetry stations, CCTV equipment, ramp monitoring equipment, batteries and chargers integral to an individual base station or repeater, base stations, repeaters, consoles, logging recorders, and antennas dedicated to an individual base station or repeater.

##### **3.5.1.3 Vaults**

A vault is any building, room, or portion of a room that is designated to provide space for telecommunications equipment.

##### **3.5.1.4 Towers**

A tower is any structure, pole, or mounting surface that is designated to provide space for telecommunications antennas.

### 3.5.2 Statewide Summary Information

The following summary information is based upon the DGS-TD database information, interviews with state agency telecommunications staff, and agency responses to surveys that were developed and submitted to agencies for this study. It is important to note that information concerning agency-owned and leased telecommunications sites was not complete and that certain assumptions had to be made. These assumptions have been noted where appropriate. For the purpose of identifying potential for consolidation, sites have been classified in the following manner:

- **Remote** – Unmanned facilities owned or leased and maintained by the state typically on a mountaintop or other isolated areas (see Figure 4). These facilities were those considered for consolidation.
- **Manned Facilities** – Facilities owned or leased and maintained by the state typically in dispatch centers or local offices (see Figure 5). These facilities were generally not considered for consolidation because the building and or tower is used for other purposes besides state public safety communications.
- **Administered** – Facilities neither owned nor maintained by the state. These sites typically include federal, local, or commercial locations.

The following paragraphs divide the facilities that are considered for consolidation into two groups.

#### 3.5.2.1 Administered Site

A site is considered to be an Administered Site if the site:

- Contains independent (not part of buildings used primarily for non-telecommunications purposes) radio towers and vaults that are shareable;
- Has vaults and towers that are not maintained by the state; and
- Is leased by the state from a non-state governmental entity or commercial entity.

Note that if the vault or tower owner has contracted the state to maintain the facility it is considered a *Maintained Site* since the spending authority for the maintenance will be required even though the state is reimbursed.

#### 3.5.2.2 Maintained Site

A site is considered to be a Maintained Site if the site:

- Contains independent radio towers and vaults that are shareable;
- Has vaults and towers that are maintained by the state; and
- The property is state-owned.

Maintained sites are considered to be the major cost element in the program.

Agency	Administered Sites	Maintained Sites <sup>3</sup>
DOJ	1	0
DGS	8	7
OES	14	0
DWR	4	0
DFG	13	1
CDC	0	0
CHP	83	90
DPR	0	0
CYA	0	0
CDF	45	81
DOT	47	17
<b>Totals:</b>	215	196

**Table 1. Existing Infrastructure Summary**

There are a total of 411 radio vault and tower sites identified within the scope of this study with potential for consolidation including 215 for administrative and 196 for maintenance consolidation. The majority of this infrastructure was built between 1990 and 2000, reflecting the relative importance and priority given to radio communications over the past decade.

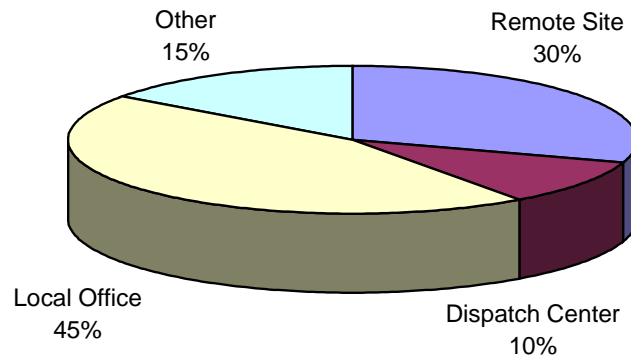
### 3.5.3 State-owned Radio Site Summary Information

Figure 2 and Figure 3 depict the general characteristics of radio sites that are owned by state agencies while Figure 4 and Figure 5 depict typical remote and manned facilities.

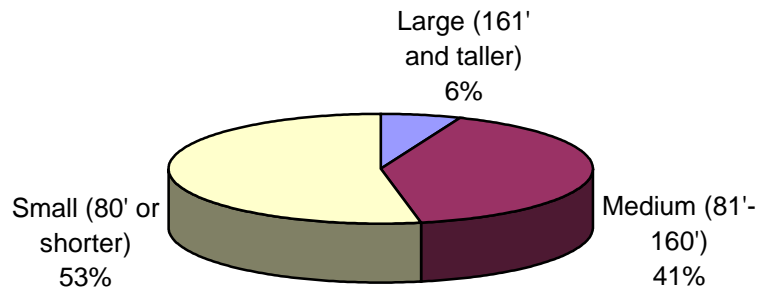
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<sup>3</sup> In addition to the definitions of infrastructure provided in Section 3.5.1 above, sites considered with potential for consolidation include only those sites that are not part of a larger, significant facility operated by an agency for special purposes. For example, dispatch centers, inspection stations, and prison facilities maintain and operate radio towers and vaults. However, given the special usage and purposes of those sites, these sites are not considered to have potential for consolidation within DGS-TD.





**Figure 2. Radio Site Classifications**



**Figure 3. Radio Tower Classification**

Figure 4 and Figure 5 depict a typical remote mountaintop site and dispatch center respectively.



**Figure 4. Calandra Remote Mountaintop Site**

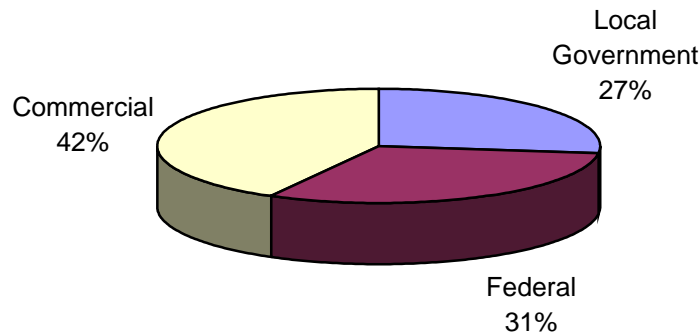


**Figure 5. Sacramento Traffic Management Center**

#### ***3.5.3.1 State Leased Site Summary Information***

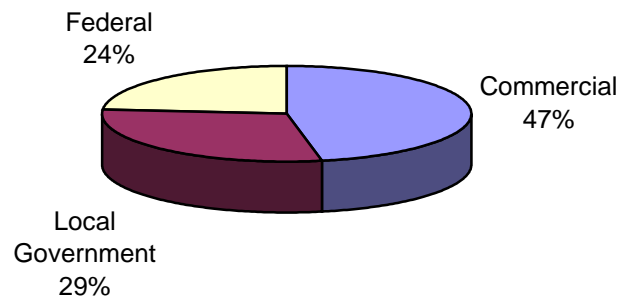
*State as Lessor* – In order to effectively utilize the state’s radio vault and tower infrastructure, state agencies lease vault and tower space to a variety of organizations including federal agencies, local governments (i.e., counties, cities, districts, etc), and commercial entities. As illustrated in (Figure 6), a substantial percentage of state-owned radio lease agreements have

been made with both public and commercial entities. Approximately one-third of state-owned radio site leases are to other local government agencies within the state:



**Figure 6. Leased Site Classification**

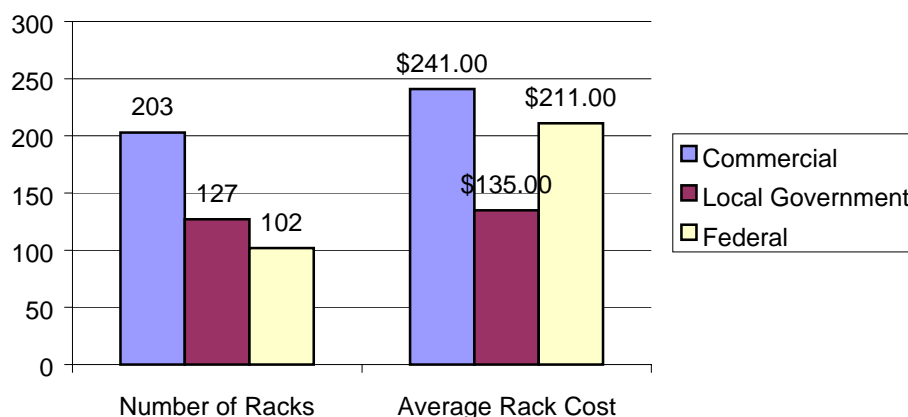
In terms of actual utilization (i.e., the actual number of rack space being rented), the relative percentage of local government and commercial use at state-owned facilities grows in comparison to federal usage (Figure 7).



**Figure 7. State-Owned Site Utilization**

Lessees of state facilities incur one-time expenditures including administrative and lease negotiation costs in accordance with standard DGS-RESO rates. Per lease administrative charges are estimated at \$1,000 per year for lease management and application services for public agencies. The DGS-RESO charges commercial lessees an initial fee of \$2,000 for lease applications to state-owned facilities.

Recurring costs incurred by lessees of state facilities vary from site to site and include payment from private landowners, commercial entities, state agencies, federal agencies, and local government agencies. Based on information provided by DGS-RESA, the average rate per radio rack charge for all lessees is approximately \$230. As illustrated in Figure 8 below, average rates for local government, federal and commercial renters display some rate variance. Total lease fees generated by the state are approximately \$350,000 annually<sup>4</sup>. This includes approximately \$85,000 in federal lease revenues, \$196,000 in commercial lease revenues, and \$69,000 in local government revenues. Finally, there are approximately 20 lease agreements, or 6.5 percent of all leases administered by DGS-RESA, that are rent-free.



**Figure 8. State Lease Revenues**

*State as Lessee* – As in cases where the state is the lessor, state agencies lease radio site space from a variety of public and commercial entities. Based on lease data provided by the DGS-RESA, and data provided by the CHP, monthly per rack costs range from \$0, for sites with interoperability agreements, to \$2,475 for high value properties. These wide ranges of lease costs reflect both market dynamics as well as habitual agreements between organizations. On average, state agencies pay \$230 per rack for radio site space including surcharges.

### 3.5.4 Department Summary Information

The following summary describes the general approach of agencies to acquire telecommunications infrastructure capability and other relevant information:

- Department of Justice (DOJ)** – The DOJ currently administers one radio site with potential for consolidation within the scope of this study. The DOJ owns radio base

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<sup>4</sup> This does not include lease revenues collected from other state agencies leasing space on state-owned facilities. This also does not include revenues generated by those state agencies that maintain lease agreements separate from those administered by DGS-RESA.

station equipment in nine Regional Offices, which do not meet the criteria for consolidation. The DOJ also has radio equipment in other facilities considered not subject to consolidation that are owned and managed by other state agencies (i.e., the CHP, the DOT, etc.) including two federal, one local, and one commercial sites. The DOJ does not provide any maintenance or services to its existing sites other than through contract with the DGS-TD and lease-space agreements. The DGS-TD provides all radio maintenance services.

- **Department of General Services Telecommunications Division (DGS-TD)** – The DGS-TD currently owns or manages 15 radio sites with potential for consolidation under the scope of this study. In addition, the DGS-TD leases space at additional radio sites considered not subject to consolidation. The DGS-TD maintains the 15 sites with facility maintenance personnel.
- **Office of Emergency Services (OES)** – The OES currently administers 14 radio sites with potential for consolidation within the scope of this study. The remaining sites consist of base station, repeaters, vaults and mobile radios located at OES and other state offices not suitable for consolidation or multi-party usage. The OES utilizes these sites to connect to statewide VHF and UHF radio networks. The DGS-TD provides all radio maintenance services.
- **Department of Water Resources (DWR)** – The DWR currently administers four radio sites with potential for consolidation within the scope of this study. The majority of the DWR radio sites consist of leased space from the CDF and the CHP. The DGS-TD provides all radio maintenance services.
- **Department of Fish and Game (DFG)** – The DFG currently owns or administers 14 radio sites with potential for consolidation within the scope of this study. The Oil Spill Recovery (OSPR), a separate business unit within the department, manages and operates four dispatch centers (call centers) that include telecommunications infrastructure, such as radio vaults and other telecommunications equipment. The DGS-TD provides all radio maintenance services.
- **California Department of Corrections (CDC)** – The CDC currently owns and operates 25 radio sites located within CDC institutions. These sites include a total of 25 radio towers and improved vault sites (several CDC vaults consist of room space located within the CDC administrative facilities). Given the location of these sites within larger prison campuses, these sites do not have potential for consolidation within the scope of this study. Though there is no designated CDC support function for radio tower and vaults, the CDC provides staff support and maintenance to this infrastructure. The DGS-TD provides all radio maintenance services.
- **California Highway Patrol (CHP)** – The CHP owns and operates 90 radio vault and tower sites that have potential for consolidation within the scope of this study. In addition the CHP leases another 83 facilities that have the potential for consolidation. The CHP is the only state agency, other than the DGS-TD, to operate its own vault and tower maintenance shops. These sites are managed by the CHP to meet the specific

needs of the department with regard to radio infrastructure requirements. The DGS-TD staff is used exclusively to maintain radio equipment.

- **Department of Parks and Recreation (DPR)** – The DPR currently does not own or manage radio tower and vault sites with potential for consolidation within the scope of this study. The DPR operates four dispatch center locations with improved radio vaults and towers that do not have a potential for consolidation. The DPR maintains a small telecommunications staff to manage the department’s telecommunications infrastructure but utilizes the DPR’s general maintenance staff to perform vault and tower services. Also, the DPR contracts with the CHP to maintain some of its radio sites. The DGS-TD provides all radio maintenance services.
- **California Youth Authority (CYA)** – The CYA does not currently own or manage radio tower or vault sites that have potential for consolidation within the scope of this study. Most radio sites located on the CYA campuses are not improved and would not be suitable for consolidation. The DGS-TD provides all radio maintenance services.
- **California Department of Forestry and Fire (CDF)** – The CDF currently owns or administers approximately 126 radio vaults and towers that have potential for consolidation within the scope of this study. Significantly, the CDF has executed a 20-year \$11.5 million bond for the development of 11 additional radio sites with a 10 percent commercial use restriction. Any consolidation will need to address this restriction. The DGS-TD provides all radio maintenance services.
- **Department of Transportation (DOT)** – The DOT currently owns or administers 64 radio tower and vault sites that would have potential for consolidation within the scope of this study. The DOT currently maintains telecommunications staff responsible for radio site management and uses building maintenance staff for facility maintenance. The DOT telecommunications staff acquires and executes lease agreements through independent contracting and procurement, and do not utilize DGS-RESA services. The DGS-TD provides all radio maintenance services.

## **4. FINDINGS**

## 4.1 OPPORTUNITY OR PROBLEM

Tower and vault consolidation opportunities and problems have been identified through the course of the study. We interviewed the key stakeholders regarding these issues, reviewed background materials, and compiled documentation from the various agencies. The resultant opportunities and problems associated with vault and tower consolidation are as follows:

### 4.1.1 Opportunities Through Consolidation

The following were identified as opportunities to improve operations and support for the state's radio vault and tower infrastructure:

- **Economies Of Scale** – In a consolidated environment, economies of scale could result in a cost avoidance associated with statewide system planning, site acquisition, lease negotiation, training, maintenance, engineering design and construction. Consolidation of these functions could result in improved financial accountability for the state. Additional cost avoidance could be achieved through the following actions:
  - Billing consolidation;
  - Consolidated funding resources;
  - Consolidated lease negotiations;
  - Reduced real property management responsibilities through the transfer of vaults and towers;
  - Centralized coordination for capital outlay planning and reporting requirements; and
  - Avoidance of costly third party commercial lessors.
- **Improved System Design, Construction, Operation And Maintenance** – By consolidating and relieving agencies of “non-core competency” activities, a single state entity could better coordinate statewide planning, engineering design, construction, operations and maintenance, and provide more uniform maintenance, installation, and standards.
- **Improved Service** – Through consolidation and centralizing the in-house expertise, a single state entity could provide the flexibility to provide uniform statewide engineering design standards for vault and tower construction. Some of these may include:
  - Providing additional services to client agencies as necessary;
  - Minimizing site access impediments;
  - Providing a higher level of service for nonpublic safety agencies;
  - Improving response times;
  - Improving access to towers and vaults;
  - Providing heightened quality control;
  - Improving security of remote facilities; and



- Providing a full technical review prior to agency site occupation.
- **Streamlined Planning And Procurement** – Through a centralized management structure, strategic planning, management planning, and access to statewide information could result in a streamlined site procurement and engineering process. There could be a potential for lower cost and less time to build, due to the ability of a single state entity to contract directly for site development. With a single state entity controlling a central funding source for emerging needs, the ability to schedule and implement in a timely manner could be enhanced.
- **Centralization Efficiencies** – Some examples of centralization efficiencies could include:
  - Centralized coordination for capital outlay planning and reporting requirements;
  - Single billing for incurred expenses;
  - Simplified utility and telephone private line billing;
  - Consolidated funding of resources;
  - Consolidated lease negotiations;
  - Reduced real property management responsibilities through the transfer of vaults and towers; and
  - Avoidance of costly third party commercial leases.

#### 4.1.2 Potential Obstacles to Consolidation

Vault and tower consolidation is a massive undertaking that will require sufficient economic, technical, and human resources to ensure its success. Not recognizing the complexity of the situation and realistic time requirements needed for success will seriously jeopardize the project. The following issues have been identified as potential obstacles to a successful implementation:

- **Inability To Obtain Adequate Resources** – Considering the competitiveness of the market, a single state entity may be challenged in its ability to obtain sufficient quality personnel. Resource limitations could translate to a lack of timeliness in obtaining either maintenance support or capital improvements.
- **Competing Priorities Among Client Agencies** – Conflicting priorities and loss of agency decision-making authority among user agencies could adversely affect operations.
- **Ineffective Program Oversight** – In a newly developed bureaucracy, attention must be focused on creating effective guidelines and policies to avoid bureaucratic barriers. These barriers could limit the ability of a single state entity to accomplish the mission of providing and maintaining the necessary telecommunications facilities.

#### 4.1.3 Strengths of Maintaining Individual Agency Control

The following have been identified as significant strengths of maintaining individual control of the state's vault and tower infrastructure:

- **Flexibility To Prioritize Agency Needs** – Individual agencies currently maintain the flexibility to internally prioritize and react to agency-specific and emerging needs.
- **Strong Community Relationships** – Individual agencies maintain strong relationships with local communities allowing them to obtain agreements that might not otherwise be available.
- **In House Operations And Maintenance Expertise** – Some agencies possess existing rapid response capabilities by their own maintenance crews.

#### 4.1.4 Weaknesses of Maintaining Individual Agency Control

The following have been identified as significant weaknesses of maintaining individual control of the state's vault and tower infrastructure:

- **No Central View Of All Tower and Vault Capital Outlay Projects**
- **Lack Of Statewide Optimization** – Inefficiencies exist among the client agencies in managing owned space and recouping costs from space users. The lack of lease rate consistency impedes each agency's ability to budget and plan for vault and tower expenditures. Consequently, inadequate funding for capital outlay projects can exist. Lack of uniform payment methods by agencies (lump sums, revenue sharing, negotiated) exacerbates the uncertainty in the budgeting, planning, and engineering design and construction process. Dangers also exist in the financial liabilities associated with Hazmat, spillage, radio outages, etc.
- **Conflicting Priorities** – A site may be more mission critical to a tenant agency than it is to the owning agency. This may result in service or improvement conflicts as the owning agency concentrates on the sites that are more critical to its mission.
- **Resource Limitations** – For many of the client agencies, the requirement to maintain radio vaults and towers falls outside of their core mission and, therefore, puts a drain on limited personnel and resources. Across all agencies, a lack of resource leveling and conflicting funding priorities contributes to higher overall costs.
- **Operations, Maintenance, Engineering And Design Not Part Of Core Competency** – Vault and tower management is neither the central mission nor core competency of individual agencies. As a result, a wide quality variance exists across the state's vaults and towers. This distributed management structure inhibits the ability to coordinate the engineering design and installation activities of a common radio system, and contributes to the difficulty in maintaining current site databases.
- **Multi-Agency Rights-Of-Way Conflicts** – Through the course of site planning and development, multiple agencies often conflict in attempts to secure rights-of-way.

Additionally, due to varying requirements, many sites do not have rights-of-way agreements adequate for shared agency use.

- **Excessive Lease Management Requirements** – The telecommunications industry pace of change is reflected in the rapid change of ownership of sites requiring frequent renegotiations. Additionally, an excessive number of agency leases possess significant access restrictions that are not yet resolved.

## 4.2 PROGRAMMATIC OBJECTIVES

We have defined the criteria or significant results that must be achieved by consolidation. The most common objective stated by all agencies involved in the study is that they should receive equal or better service for the same cost after consolidation. In order to measure the success of consolidation, the following critical success factors have been identified as those by which success should be measured:

- **Organizational Structure And Agency Buy-In** – Strong stakeholder buy-in and agency input from the outset will be necessary for a successful implementation. The project must establish a structure with clearly defined responsibilities and scope statements for all stakeholders.
- **Improved Service** – The project should provide for the timely replacement of aging infrastructure and ensure the timeliness of construction and maintenance.
- **Realized Cost Efficiencies** – As a result of economies of scale achieved through consolidation, the state should realize cost efficiencies and should realize improved productivity of existing client agency resources. There will need to be some redirection of funds to accomplish these efficiencies.
- **Minimal Disruption During Implementation** – There must be no interruption of service during the transition period. In order to minimize the budgeting and operational impact, the project should consider a phased implementation schedule to mitigate transition risks. Consolidation should include a complete transfer of responsibilities to include roads, rights-of-way, and other components of tower management.
- **Acquisition Of Adequate Staffing And Funding** – A single state entity must receive adequate staffing and funding to ensure the success of this project. In its current status, the DGS-TD does not have ample staffing and funding resources to manage vault and tower consolidation at an acceptable level.

## 4.3 REQUIREMENTS

This section defines the needs and requirements for a successful consolidated vault and tower management structure. These needs and requirements were derived through an analysis of the available data as well as interviews with agency stakeholders.

- **Effective Governance** – An organizational infrastructure is needed to support the implementation and long-term management of the state's vault and tower consolidation

initiative. An organization with ownership and management responsibilities is necessary to provide leadership and strategic direction.

- **Well-Planned And Integrated Project Schedule** – The selected timing of implementation will affect the ability of a single state entity to obtain the sufficient resources necessary to transfer responsibility without interruption of service. Central to all scheduling requirements is mitigating the implementation risk involved with transferring vaults and towers from individual agencies to a single state entity control. Specific criteria for identifying sites suitable for consolidation, along with determining an appropriate timeline for migration, will be required to ensure project success.
- **Coordination With PRISM And Microwave Projects** – Governance, cost allocation, and other key project objectives should be supportive of future PRISM and microwave goals. Resources amongst these various projects must be coordinated to the fullest extent possible.
- **Defined Service Levels** – In the interviews with each agency, representatives were asked to define their agency's minimum service level requirements for radio tower and vault operations. Some of the specific components of service level agreements between the governing entity and individual agencies will need to be identified.
- **Adequate Security** – Security requirements vary by agency and by site. While some agencies sites such as the CYA and the CDC have extremely stringent requirements, other agencies sites do not require similar guidelines. Specific security requirements for sites will need to be addressed on a site-by-site basis.
- **Transfer Site Ownership And Leasing** – Ownership transfer must occur in a logical, phased approach resulting in minimal disruptions with operations. In addition to general concerns over transferring control, individual agencies must identify specific sites that they believe are suitable for ownership transfer, considering factors such as location, security and functional issues.
- **Establish Funding Mechanisms** – Modern radio vaults and towers require significant initial investments in system infrastructure as well as ongoing investments in user fees and/or long-term maintenance. An adequate funding mechanism must be identified that will support priorities from the client agencies.

## **5. ALTERNATIVES ANALYSIS**

An analysis of the current environment and needs and requirements, and an analysis of the alternative approaches and options were conducted. The following issues surrounding consolidation of the vault and tower infrastructure were considered:

- Governance;
- Coordination with PRISM;
- Implementation Schedule;
- Operations and Maintenance;
- Service Levels;
- Site Ownership and Leasing; and
- Funding.

## 5.1 GOVERNANCE

The governance model chosen for the consolidation program will be critical to its success. Regardless of the model chosen, the processes and procedures must provide the authority, flexibility, and structure to meet the needs of the user agencies and the public they serve. Central to any governance model are clearly defined leadership authority, management responsibilities, and decision-making processes. Mechanisms should be put in place that balance the needs of the multiple user agencies with the availability of resources. For example, if historical relationships exist between an agency and the local community, that agency could be requested to maintain the relationship. Finally, regardless of the governance approach that is adopted, the governing body must have the requisite authority necessary to effect program requirements. The responsibilities of the governing structure may include providing advice regarding:

- **Establishment Of A Process For Resource Prioritization** – Multiple requests for service could be made that exceed the availability of resources. A mechanism for prioritization should be developed and implemented based upon established criteria.
- **Planning For And Executing New Construction And Site Upgrades** – Disasters, emerging needs, the need to modernize, and planned replacement/upgrades will necessitate the expenditure of capital funds. The governing authority should plan for, schedule, and authorize expenditure of these funds.
- **Setting Billing Rates** – The vault and tower lease rates should be determined and rates established to ensure that actual costs are recovered.
- **Allocating Cost Among User Agencies** – The allocation of fair and equitable “fee for service” costs among the user agencies should be developed based upon established criteria.
- **Maintaining Oversight Of Site Architecture And Standards** – Provide advice on vault and tower standards with regard to construction, security, maintenance, and other service levels.

- **Establishing And Managing Service Levels** – The governing authority should establish defined service level based on the current levels for both public service and public safety agencies.
- **Establishing And Managing Interagency Boundaries** – The governing authority should establish clear lines of demarcation between telecommunication vault/tower space and client agency facilities and property. Responsibilities and degrees of authority should be established in order to effectively manage the vault and tower infrastructure. The governing authority should have the flexibility to request resources or assistance from the client agencies if required to support mission needs.
- **Establishing Grievance And Appeal Processes** – For cases of conflicting priorities, a process should be developed to adjudicate agency grievances and provide for appeals.
- **Establishing Ongoing Users Groups** – These functional groups should be established to communicate daily needs and become a tool for agency feedback at the operational level.

Given the public safety mission of many of the client agencies, there must be a recognition of the inherent delays involved with a multi-agency decision making body. The managing agency must be given discretionary authority to react through the expenditure of funds or other resources in response to unplanned circumstances in a timely manner.

The following governance models were considered viable alternatives for the state with each model considering the issues previously stated:

**Alternative 1: Manage Program Governance Within The DGS-TD** – The DGS-TD would internally manage and prioritize all decisions regarding the vault and tower infrastructure. User agencies would make request for facilities and services in accordance with policies and procedures developed by the DGS-TD. User groups could be established as necessary to provide agency input.

*Advantages*

- Clearly defined responsibilities and levels of authority
- Accountability by a single agency
- Ability to react quickly to emerging needs
- Streamlined prioritization process

*Disadvantages*

- Potential lack of client agency input and buy-in

**Alternative 2: Establish An Advisory Committee** – Each agency would be represented on an advisory committee by either one voting member or voting would be weighted according to the number of vaults/towers owned by the agency or given up to consolidation by the agency.

*Advantages*

- Improved communication among the DGS-TD and user agencies
- Advisory committee provides venue for agency input and open discussion of project needs

*Disadvantages*

- Potential delays in the decision making process
- No one agency is accountable

## 5.2 COORDINATION WITH PRISM

The PRISM program is tasked with the forward planning and ultimate implementation of a statewide interoperable, multi-jurisdictional, multifunctional digital wireless communications infrastructure able to accommodate all state public safety and public service agency wireless communications needs. A secondary objective is to accommodate the federal or local public safety and public service agency wireless communications needs of those agencies choosing to participate. To support this communications infrastructure, the PRISM program anticipates that many new and existing vault and tower sites will be required. The following alternatives were considered from the perspective of the PRISM program:

**Alternative 1: Treat PRISM As A Separate Client Agency** – Under this alternative, the vault and tower consolidation program would be implemented and managed independently of the PRISM program. This would give the PRISM a single point of contact for site acquisition, development, and utilization. The PRISM would, in effect, maintain a client relationship with the vault and tower consolidation program providing requests for resources in the same manner as any client agency. This arrangement would alleviate the need for the PRISM to coordinate with multiple agencies for the use of vault and tower space. The following benefits to the state as they relate to the PRISM could be achieved:

- Telecommunications equipment installation and maintenance schedules could be more efficiently managed and controlled;
- Site acquisition and construction would be planned and coordinated through a single management structure;
- The time necessary to gain access to PRISM sites could be minimized through a centralized management structure;
- Lower administrative overhead costs could be achieved;
- Standardization of site configurations, documentation, and service levels would minimize or reduce planning efforts;
- A more complete and centralized database of site configurations would facilitate the planning process; and
- Reduced maintenance and operations costs due to centralized expertise.



*Advantages*

- Single point of contact for all facilities requests
- Centralized planning and control
- Economies of scale

*Disadvantages*

- The PRISM must compete for resources with all client agencies

**Alternative 2: Continued Individual Agency Control Of Vaults And Towers** – Under this alternative, the PRISM program would be required to coordinate vault and tower utilization with multiple agencies maintaining ownership or control. This approach could negatively impact the PRISM's ability to gain access to sites for purposes of development and subsequent use in a timely manner. While centralized control would enhance the PRISM's ability to optimize the fulfillment of its responsibilities, decentralized control could complicate the ability to achieve this optimization. With a decentralized infrastructure, the PRISM should address the following considerations:

- Expectations need to be established with each agency maintaining ownership or control;
- Policies and procedures including service levels need to be formulated and acknowledged by all affected agencies;
- Consequences and remedies for nonperformance by each affected agency need to be established; and
- Recourse must be available to PRISM in the event that one of the participants is not performing according to program requirements.

*Advantages*

- The PRISM maintains internal control and management of all program vaults and towers

*Disadvantages*

- Coordination required with multiple agencies
- Redundant efforts

### 5.3 IMPLEMENTATION SCHEDULE

The selected timing of implementation will affect the ability of the DGS-TD and the client agencies to obtain sufficient resources necessary to transfer responsibility without impairment of service. The considered alternatives are predicated on the requirement that there be no impairment of service and that sufficient resources are obtained by all affected stakeholders. Each alternative must take into consideration the following issues surrounding transfer of ownership:

- Transfer of leases, easements, and rights-of-way (Section 5.6);
- Acquisition of sufficient maintenance and administrative personnel with facilities expertise; and

- Acquisition of sufficient assets, consumables and commodities to manage the vaults and towers.

**Alternative 1: Transfer All Affected Sites To The Ownership Or Control of A Single State Entity On Predetermined Date** – Ownership or control of all affected vaults and towers could be transferred to a single state entity on a date determined by that entity. This alternative would have the greatest impact to the single state entity and the client agencies. In order to accomplish the transfer of control on a single date, all resources must be in place and capable of performing maintenance statewide. Additionally, the transfer of leases, easements, and rights-of-way agreements must be completed by the predetermined date.

*Advantages*

- Clearly defined cutover date reduces ambiguity

*Disadvantages*

- Large up front effort
- Substantial impact to the single state entity and client agencies
- High risk of not obtaining sufficient personnel and resources
- Large effort to transfer leases, easements, and rights-of-way

**Alternative 2: Implement A Phased Migration Schedule** – This alternative allows a single state entity to assume responsibility in a phased approach, thereby minimizing the impact to the single state entity and the client agencies. This approach will mitigate the risk of implementation by allowing the single state entity to 1) obtain sufficient resources; and 2) establish and refine processes and procedures over an extended period. It further mitigates the risk of the single state entity obtaining sufficient qualified personnel by allowing linkage between consolidation and the acquisition of those resources. Additionally, as the PRISM program obtains telecommunication sites, the single state entity would assume responsibility for control and maintenance. The transfer would be closely coordinated with the PRISM program. Prior to program initiation, a project plan and schedule should be developed detailing all steps and timelines necessary to accomplish the previously defined issues surrounding the transfer of ownership. The ability to implement would be based upon obtaining the budget authority, funding, and required personnel.

*Advantages*

- Increased likelihood of obtaining sufficient personnel and resources
- Reduces impact to the single state entity and client agencies
- Effort spread over extended period

*Disadvantages*

- Without defined cutover date, transfer could extend beyond desired timeframes

## 5.4 OPERATIONS AND MAINTENANCE

If consolidation is selected, a single state entity would be given the mandate of authority and responsibility for all consolidated telecommunications sites and their respective facilities. These responsibilities would also include the mandate of authority and responsibility for all lease administration of non state-owned telecommunications sites. A single state entity would furnish complete telecommunications facilities services of site acquisition, site lease management, site facilities engineering design, construction, repair, and maintenance of all consolidated sites. A single state entity would perform these services by using the single state entity employees or by contracting-out for the required services, as dictated by the operational tempo and existing in-house workload.

In order to perform this new function, the single state entity would place the required activities needed to fulfill this mandate within a new Tower and Vault Section, within the Telecommunications Division. This section would contain three work groups:

- Engineering, Design and Construction;
- Administration; and
- Maintenance.

Administrative functions would include the responsibility to acquire all telecommunications sites and rights-of-way by purchase of real property, lease, license, or permit. The single state entity would administer, negotiate, process, both new and renewal of telecommunications site leases, agreements, permits, licenses, road maintenance agreements, and lease payments. All required environmental studies, field studies, and required CEQA documentation for all consolidated telecommunications sites would be performed by the DGS. The single state entity would be authorized to perform the construction and contractor oversight of telecommunications sites, vaults, towers, power systems, and access roadways.

The single state entity would be responsible to perform the repair and maintenance to keep the facilities operating satisfactorily. These functions would include both preventative maintenance and response activities such as pest control, propane tank inspection/replacement, electric generator inspection/replacement, roadway inspection/repair, and tower and building (vault) inspection/repair. On a periodic basis, the single state entity would provide preventative

maintenance activities for the vaults and towers. In order to respond to system failure, a three-tier maintenance response methodology has been preliminarily proposed:

- **First Response Level** – The VHF telecommunications technician responsibilities expand to perform basic facilities troubleshooting functions such as resetting tripped circuit breakers, servicing generator fuel and oil, servicing generator coolant, attempting to initiate backup power systems, inspecting vault and tower for basic integrity, and contacting the facilities section as required
- **Second Response Level** – For facility repairs exceeding the capability of the first level response technician, a Telecommunications Facility Technician would repair and or replace intermediate level items including wiring problems, circuit breakers, circuit boards, generator tune up, building fan(s), engine fan, water pump, small roofing leaks, broken door parts, air conditioning fluids, pest control, fluid hoses, weed abatement, fencing repairs, and air conditioning repairs, etc.
- **Third Response Level** – The Facilities Maintenance Section would manage major repairs or modifications. Identified problems would be directed to Engineering Design and Construction for corrective action. Responsibilities would typically include replacement of roofing, generators, air conditioning, propane systems, and repair or replacement of towers and vaults.

The following operations and maintenance alternatives assume that the previously stated responsibilities rest with a single state entity:

**Alternative 1: Establish Dedicated DGS-TD Vault And Tower Maintenance Capability** – To support the maintenance and operations of the vault and tower infrastructure, a single state entity would establish a dedicated administrative, engineering, and maintenance capability. This will include the acquisition of additional personnel, equipment, vehicles, consumables, maintenance and staging facilities, and maintenance replacement materials in support of each response level. Estimated staffing, facilities, and equipment levels will be discussed in detail in Section 6.

*Advantages*

- By redirecting efforts from non-mission critical tasks, increased productivity of client agency personnel
- Maintenance schedules more efficiently managed and controlled
- Centralized maintenance and operations expertise
- Standardization of site configurations, documentation, and service levels
- More complete and centralized database of site configurations
- Consolidated administrative overhead costs

*Disadvantages*

- Potentially available client agency labor pool not utilized. Although transfer of personnel from other agencies is possible.
- Recurring and nonrecurring costs associated with providing this level of service

**Alternative 2: Utilize Existing Maintenance Capabilities Of The User Agencies** – Several of the client agencies maintain either dedicated or collateral duty vault and tower maintenance personnel. Under the supervision and management of a single state entity, these resources could be scheduled or dispatched in support of first or second response level events. Under this alternative, a mechanism for agency reimbursement of funds would be required.

*Advantages*

- Potentially available client agency labor pool more fully utilized

*Disadvantages*

- By redirecting efforts from non-mission critical tasks, reduced productivity of client agency personnel
- Maintenance schedules less efficiently managed and controlled
- Lack of standard maintenance practices
- Greater administrative overhead costs
- Lack of centralized maintenance and operations expertise

**Alternative 3: Outsource Maintenance Activities To A Third Party Vendor** – To support the maintenance and operations of the vault and tower infrastructure, a single state entity could contract for any part of or all functions with regard to engineering and maintenance. This could include the contracting for engineering and maintenance personnel, equipment, vehicles, consumables, maintenance and staging facilities, and maintenance replacement materials in support of the vault and tower infrastructure.

*Advantages*

- Established maintenance agreements with third party vendor
- Known fixed costs
- Leverage of commercial resources
- Reduced risk of obtaining sufficient personnel and resources
- Potential reduction in state personnel

*Disadvantages*

- Possible risk of lack of performance during critical public safety operations
- Resistance from labor unions
- Impact on employees
- Potential lack of flexibility in service contracts
- Loss of control
- Increased contract management staff

## 5.5 SERVICE LEVELS

In a consolidated environment, the level of service provided to the client agencies must be sufficient for those agencies to meet their public safety and public service responsibilities. These service levels should support the current level of service the DGS-TD supplies in the maintenance of the radio systems for the agencies. Additionally, a mechanism for prioritizing requests for service should be established. Minimum acceptable repair time and maximum allowable outage will vary from site to site. Any future method of prioritizing service requests should identify those sites in mission critical areas. Facilities response requirements will be dependent on the mission criticality to each agency. The following key performance indicators should be considered for a consolidated maintenance environment:

- 24 hours per day, seven days per week (24/7) central support coverage;
- Response and support for mission critical needs including:
  - Priority response for public safety agencies;
  - Immediate response during disasters (e.g. floods, earthquakes, etc.);
- Periodic preventative maintenance inspections and activities;
- Available temporary/mobile sites/vaults and towers during disaster recovery;
- Remote monitoring of site facilities;
- Road or alternative transportation site access;
- Statewide uniform standards for vaults, towers, HVAC systems, and other equipment;
- Vaults maintained clean and pest free;
- Physical security appropriate to the site location and criticality; and
- On site personnel at major telecommunications sites.

The following service level approaches were considered viable alternatives for the state with each model assuming the responsibilities previously stated as deemed necessary by the governance authority:

**Alternative 1: Provide Radio Tower And Vault Service In Support Of Current And Future Written Radio System Service Level Agreements (SLA)** – The DGS-TD and the many client agencies have entered into a formal written Service Level Agreements (SLA) where key performance indicators become mandatory. A SLA is a commitment that typically specifies:

- Services to be provided;
- Standards to be met in the provision of those services; and
- Methods for escalation in the event those standards are not met.

This approach would, however, necessarily require additional resources to satisfy all requirements. Given the inevitability of change, it is important for flexibility to be built into any SLA with the terms and conditions subject to periodic review and approval by the governing authority.

*Advantages*

- Clearly defined service levels for all agencies
- Radio system performance focused
- Ease of planning
- Consistency among sites
- Agency buy-in

*Disadvantages*

- Higher costs required to guarantee all services
- Can be difficult to achieve for government agencies

**Alternative 2: Provide Radio Tower And Vault Service Levels As Prioritized In The Governance Process** – Given limited resources and emerging requirements, it may become necessary to allocate personnel or equipment dependant upon the requirements set by the governing authority. This approach would eliminate written performance guarantees and consequences while setting performance objectives subject to prioritization.

*Advantages*

- Better utilization of available funds
- Ability to redirect resources in response to emerging requirements

*Disadvantages*

- Potential lack of site or service consistency
- Not radio system performance focused

## 5.6 SITE OWNERSHIP AND LEASING

The various state agencies currently maintain a large infrastructure of property in support of their telecommunications needs. Additionally they maintain, through the DGS-RESO or independently if authorized, lease agreements with non state-owned facilities. The transfer of ownership and responsibility of these sites, leases, and agreements would be a large undertaking requiring significant preplanning and coordination between a single state entity and the user agencies. Following a decision to consolidate, the effort to collect, collate, and review all

outstanding agreements should be undertaken immediately. Ownership transfer should occur in a logical, phased approach resulting in minimal disruptions with operations. To accomplish this, all required resources should be available prior to the transfer of responsibility.

Functions following any transfer would include the responsibility to manage the identified telecommunications sites and rights-of-way, leases, licenses, and permits. This would include the authority and responsibility to administer, negotiate, process, both new and renewal of the identified telecommunications site leases, agreements, permits, licenses, road maintenance agreements, and lease payments. Under this arrangement, agencies requiring vault or tower space on consolidated or non state-owned sites would make requests through the DGS.

**Alternative 1: Transfer All Property Ownership And Lease Management Responsibilities To A Single State Entity** – In accordance with California Government Code Section 14673 which governs control and possession of real property owned by the state, the control and possession of such property may be transferred from one state agency to another with the written approval of the Director of the DGS. Under this alternative, consolidation program staff would assume ownership or management responsibility for all telecommunications sites, easements, and rights-of-way considered subject to consolidation. Additionally, a single state entity would assume responsibility for the management and administration of all leases, licenses, or permits for non state-owned sites. These leases could be transferred to the single state entity at the time of expiration or during the middle of the term dependant upon terms and conditions within the lease. The single state entity would administer, negotiate, and process, both new and renewal of telecommunications site leases, agreements, permits, licenses, road maintenance agreements, and lease payments. The following actions or reviews should be completed in order to support an orderly transfer:

- Prior to consolidation, a detailed review and analysis should be undertaken of all outstanding leases, agreements (rights-of-way, interoperability, etc.), and bonds for the purpose of identifying expiration dates and transfer or other usage/access restrictions. Also, the single state entity should use this information to ensure that leases or agreements are not inadvertently allowed to lapse as consolidation nears;
- Prior to consolidation, perform a detailed review and analysis of all outstanding annual renewable contracts (e.g. pest control, propane, fuel, etc) for the purpose of consolidating contracts or renewing agreements;
- Undertake a review of historical community relationships or other restrictions that may inhibit transfer; and
- On a site-by-site basis, review any agency unique access restrictions that may inhibit operations and maintenance.

*Advantages*

- Centralized management of all leases and agreements

*Disadvantages*

- Potential loss of historical local community relationships



- Centralized property management expertise
- Potential cost of agency reimbursement

**Alternative 2: Continue Agency Control Of Property Ownership And Lease Management Responsibilities** – Under this alternative, site ownership and control of lease management would remain under control or ownership of the client agencies with a single state entity then simply providing maintenance services on the vaults and towers. Under this arrangement, a single state entity would also manage and direct all vault and tower utilization.

*Advantages*

- Continued historical local community relationships
- Minimizes agency unique access restrictions

*Disadvantages*

- Inefficient management of leases and agreements
- No centralized property management expertise

**6. ESTIMATED COST DETAIL**

## 6.1 ESTIMATED COST DETAIL

In a consolidated environment, a single state entity would be given the mandate of authority and responsibility for all telecommunications sites and their respective facilities considered subject to consolidation. These responsibilities would also include the mandate of authority and responsibility for all lease administration of non state-owned telecommunications sites. The single state entity would furnish complete telecommunications facilities services of site acquisition, site lease management, site facilities engineering design, construction, repair, and maintenance of all consolidated sites.

### 6.1.1 Assumptions

Cost estimates related to vault and tower consolidation are subdivided by:

#### Fixed site costs

- (1) Operations and Maintenance
  - a. Engineering Design & Construction
  - b. Administrative
  - c. Maintenance
- (2) Capital Outlay
- (3) One-time start-up costs

#### Variable site costs

- (1) Land and site leases

On a per annum basis, these costs will be used to derive the vault and tower access charges for the TD-310. Costs among state maintained sites would vary depending upon land lease rates. It is further assumed that for sites not maintained by the state, rates will be established that will include actual lease costs and administrative overhead.

To support the maintenance and operations of the vault and tower infrastructure, the single state entity will establish a dedicated administrative, engineering, and maintenance capability. This will include the assignment of personnel, equipment, vehicles, consumables, maintenance and staging facilities, and maintenance replacement materials. These resources will be obtained through new acquisitions and hires, reassignment of existing state resources, or utilization of resources outside the administrative control of a single state entity.

Estimated support levels are based on data provided by the CHP as they relate to the operation, maintenance, and construction of the CHP's telecommunications facilities and associated equipment. This information is considered representative of the costs a single state entity will

incur upon assuming management responsibilities. The DGS-TD provided the information on personnel and related operating costs.

### 6.1.2 Existing Sites

Cost projections are based upon the existing site counts identified through data provided by client agencies and the DGS-TD records. Existing sites are defined as those that are currently operational and would, as part of the proposed restructuring, be subject to consolidation. Sites have been categorized as Administered or Maintained. An “Administered” site is one where the site is leased from non-state providers and they do the maintenance. A “Maintained” site is one where the state provides the maintenance and the site is usually state-owned. The correlating cost estimates for support and maintenance in the following tables are based upon the volume of sites listed in Table 2.

Table 3 identifies the estimated existing sites that have been identified for consolidation by the CDF, the OES, the DPR, the DOT, the CHP, the DWR, the CDC, the DFG, the DGS-TD, and the DOJ:

Department	Administered	Maintained
DOJ	1	0
DGS	8	7
OES	14	0
DWR	4	0
DFG	13	1
CDC	0	0
CHP	83	90
DPR	0	0
CYA	0	0
CDF	45	81
DOT	47	17
<b>Total</b>	<b>215</b>	<b>196</b>

**Table 2. Site Counts**

## 6.2 OPERATIONS AND MAINTENANCE

Operations and maintenance costs include all personnel, hardware, and consumable expenditures necessary to fund the day-to-day engineering, administration, and maintenance of the state’s radio vault and tower infrastructure.

## 6.2.1 Engineering Design And Construction

The following costs are based upon the responsibility of a single state entity to perform engineering design including the engineering of all telecommunications sites, vaults, towers, power systems, and access roadways. It is anticipated that these costs will be divided evenly between operations and maintenance and capital outlay tasks. Support levels have been adjusted, where necessary, to account for changes in site inventory.

### 6.2.1.1 Personnel

The following personnel costs are based upon anticipated staffing levels and include ancillary cost factors such as staff benefits travel costs, training costs, and miscellaneous support costs. Travel expenses are paid to employees who incur costs while traveling to perform tasks associated with telecommunications facilities.

Based upon the anticipated staffing levels, the total estimated engineering, design, and construction personnel cost is \$640,000. After assigning 50 percent of these costs to capital outlay, the total estimated engineering, design, and construction personnel cost attributed to operations and maintenance is approximately \$320,000.

### 6.2.1.2 Miscellaneous Costs

Miscellaneous expenses incorporate vehicles used in conjunction with telecommunications as well as their repair and maintenance. Additionally included are costs associated with installation, maintenance and repair of propane tanks and generators. Facilities also require regular maintenance as well as the purchase of minor equipment (less than \$5,000). Miscellaneous costs include those associated with:

- Total vehicle miles driven per year;
- Propane tank fueling costs including upgrades and replacements. This includes installation permits, total material and service cost per installation, and labor;
- Generator costs consisting of upgrades, replacements, installation and maintenance; and
- Electrical installations and procurement of minor equipment costs.

Based upon these assumptions, the total estimated engineering, design, and construction miscellaneous cost is \$20,000. After assigning 50 percent of these costs to capital outlay, the total estimated engineering, design, and construction miscellaneous cost attributed to operations and maintenance is approximately \$10,000.

### 6.2.1.3 Engineering Design and Construction Total Cost Estimates

Personnel	\$320,000
Miscellaneous Costs	<u>10,000</u>
<b>TOTAL</b>	<b><u>\$330,000</u></b>

## 6.2.2 Administration Section

The following costs are based upon the responsibility of a single state entity to acquire all telecommunications sites and rights-of-way by purchase of real property, lease, license, or permit. A single state entity will administer, negotiate, and process, both new and renewal of telecommunications site leases, agreements, permits, licenses, road maintenance agreements, and lease payments. All required environmental studies, field studies, and required CEQA documentation for all consolidated telecommunications sites would be performed by the DGS. A single state entity will be authorized to perform the construction and contractor oversight of telecommunications sites, vaults, towers, power systems, and access roadways.

### 6.2.2.1 Personnel

Administrative personnel costs are based upon the anticipated staffing levels and include ancillary cost factors such as staff benefits, overtime, travel, training, and miscellaneous support costs. Travel expenses are paid to employees who incur costs while traveling to perform tasks associated with telecommunications facilities. Based upon the anticipated staffing levels, the total estimated annual administrative personnel cost is \$360,000.

### 6.2.2.2 Rents and Services

Rents are allocated for locations in Sacramento and Southern California and include fenced storage, storage enclosed within the building, and maintenance space. Services include road maintenance, electrical, propane fuel, diesel fuel, and pest control costs. These costs include a purchase order issuance burden. The number of sites assumes a 75 percent fill ratio. The total estimated cost for rents and services is \$2,060,000.

### 6.2.2.3 Administration Total Cost Estimates

Personnel	\$360,000
Rents and Services	2,060,000
<b>TOTAL</b>	<b><u>\$2,420,000</u></b>

## 6.2.3 Maintenance Section

The following costs are based upon the responsibility of a single state entity to perform the repair and maintenance necessary to keep the facilities operating satisfactorily. These functions will include both preventative maintenance and response activities such as pest control, propane tank inspection / replacement, electric generator inspection / replacement, roadway inspection / repair, tower and building (vault) inspection / repair. For the purpose of this economic analysis, the proposed three-tiered maintenance methodology is utilized.

### 6.2.3.1 Personnel

Maintenance personnel costs are based upon the anticipated staffing levels and include ancillary cost factors such as staff benefits, overtime, travel, training, and miscellaneous support costs.

Personnel will be geographically divided between the north and south support units. Travel expenses are paid to employees who incur costs while traveling to perform tasks associated with telecommunications facilities. Based upon the anticipated staffing levels, the total estimated annual maintenance personnel cost is \$1,290,000.

#### **6.2.3.2 *Miscellaneous Costs***

Miscellaneous vehicle costs are based upon an estimated 20 vehicles driven a total of 234,269 miles, fuel costs, increases in fuel costs, and a rate of 10 miles per gallon. This estimate includes repairs (both external and in-house), maintenance and operation costs. Miscellaneous supplies consist of safety equipment, parts, construction materials (e.g., concrete), one-time contracts, cell phones and pagers. Based upon supply, commodity, and consumable data provided by the CHP data, the total estimated annual miscellaneous maintenance cost is \$390,000.

#### **6.2.3.3 *Maintenance Total Cost Estimates***

Personnel	\$1,290,000
Miscellaneous	<u>390,000</u>
<b>TOTAL</b>	<b><u><u>\$1,680,000</u></u></b>

### **6.3 VARIABLE LEASE COSTS**

Client agencies currently incur costs for both land lease and facility rental. These costs vary from site to site and include payment to private landowners, commercial entities, state agencies, federal agencies, and local government agencies. In a consolidated environment, there will be no variable lease costs associated with sites where the state owns the property and provides maintenance functions.

Projecting the CHP averages across the sites identified for consolidation, the DGS-TD estimates that the total annual variable lease expenditures of the client agencies totals \$2,804,054. Consequently, the DGS-TD estimates that variable lease charges on the TD-310 will range from zero for state-owned and maintained sites to \$474 per month per rack for some privately-owned and commercial sites.

### **6.4 OPERATIONS AND MAINTENANCE COST SAVINGS**

It is anticipated that the consolidation of the operation and maintenance of the vaults and towers will result in an overall cost savings to the state. This will occur because a single work force will be responsible for all of the sites. The result will be an elimination of duplicate work forces and the creation of uniform procedures that will produce a savings in both hours expended and required staffing level. This will require some redirection of funds. There will be no new costs, only old costs being realized by different agencies.

It is difficult to put a dollar figure on the cost savings since the agencies utilize available staff for much of the current operations and maintenance work. As a result, the actual current cost is not known. The only figures that are available are those from the CHP. The figures that the CHP provided do not include all of the cost the agency incurs, they only reflect the direct cost of the field staff that maintains the vaults and towers.

Additional cost savings will occur because the larger site base will allow the state to enter into more cost effective contracts for the goods and services that need to be purchased for the operation and maintenance of the vaults and towers. The standardization of materials and services will allow the most cost effective products to be purchased at the lowest cost. When outside design or maintenance services are needed, the larger purchasing base will provide the state with a stronger voice in the negotiations.

## **6.5 CAPITAL OUTLAY**

The recovery of funds for capital improvements and new construction will include all costs associated with the administration, engineering, and implementation of those efforts. Administrative functions include the responsibility to perform all functions necessary to obtain telecommunications sites and rights-of-way by purchase of real property, lease, license, or permit. These functions include, but are not limited to, compliance with the CEQA or other environmental requirements. Engineering functions include the design and engineering of all telecommunications sites, vaults, towers, power systems, and access roadways specific to a capital project. This includes all costs associated with project management and actual construction.

We anticipate that capital improvement or new construction of the vault and tower infrastructure would be accomplished through the use of funds accumulated in an established sinking fund. Based upon anticipated capital outlay costs, a surcharge will be placed on vault and tower operations and maintenance charges for inclusion in the DGS Service Revolving Fund. Spending authority will be obtained either permanently or annually through the normal budgeting process.

For the purpose of this analysis, major site upgrades are considered those greater than \$467,000, and minor site upgrades are considered those that are less than \$467,000. Upgrades to sites are considered over the life of the upgrade itself. Therefore, the aggregate costs were considered as an average of sites per year based on total years to complete (Table 3). These construction projects would typically include telecommunications sites of \$1,500,000 or less in cost, sites of one acre or less in size, vaults of 1,999 square feet or less in size, and towers of 300 feet or less in height.



Expenditure	Qty.	Years to Complete
Major site upgrades and new construction	72	10
Minor site repair	99	10

**Table 3. Anticipated Site Upgrade Projects**

Based upon the anticipated number of site upgrade projects (Table 3) including contract fees, vehicle operating costs, and the \$330,000 engineering design and construction cost attributed to capital outlay (see Section 6.2.1), the total capital outlay budget for 10 years is estimated at \$96,200,000. Note that only those sites with immediate need of upgrade were considered and the ten-year period was chosen as a reasonable time period to accomplish the work.

## **6.6 TRANSITION PLANNING COSTS**

Transition planning costs represents the one time costs necessary to establish a tower and vault consolidation program. These costs assume all resources will be obtained through open procurement and will not transfer from existing state programs. We estimate transition planning process will take at least 18 months to do site assessment and develop a detailed tower and vault consolidation program implementation plan with the goal of beginning the consolidation program FY 2003/04. If the recommendations of this report are accepted, a single state entity will require funding for the transition planning process. The transition planning process will include developing detailed cost estimates for the operations, maintenance, renovation, modification, and construction of vaults and towers. The transition planning costs do not include ancillary requirements such as uniforms, janitorial services, and drinking water, etc. Transition costs have been divided into two categories:

- **Engineering Design and Construction** – These transition costs include staff time, the purchase of four-wheel vehicles, trucks, concrete mixers, building materials, water tanks, generators, radios, tools and equipment, generators and automatic transfer switches, transportable telecommunications vault, emergency telecommunications tower, and air conditioning units. The total estimated engineering design and construction start-up cost is \$1,210,000.
- **Maintenance** – Transition costs associated with maintenance activities include staff time, the purchase of four-wheel vehicles, service vehicles, tools and equipment, and vehicle radios. The total estimated maintenance start-up cost is \$1,390,000.

### 6.6.1 Transition Cost Estimates

Engineering Design and Construction	\$1,210,000
Maintenance	<u>1,390,000</u>
<b>TOTAL</b>	<b><u>\$2,600,000</u></b>

### 6.7 COST SUMMARY

The following budget estimates are for one year of a ten-year period in 2001 dollars and they are anticipated as inputs to the lease arrangement process for vaults and towers maintained by the state:

	Low (-10%)	Expected Cost	High (+25%)
<b>Operations and Maintenance</b>			
Engineering, design & construction	\$ 297,000	\$ 330,000	\$ 412,500
Administration	2,178,000	2,420,000	3,025,000
Maintenance	1,512,000	1,680,000	2,100,000
Subtotal:	<u>3,987,000</u>	<u>4,430,000</u>	<u>5,537,500</u>
<b>Capital Outlay Surcharge</b>			
Contract costs	8,658,000	9,620,000	12,025,000
Engineering, design & construction	297,000	330,000	412,500
Subtotal:	<u>8,955,000</u>	<u>9,950,000</u>	<u>12,437,500</u>
<b>Total:</b>	<u>\$ 12,942,000</u>	<u>\$ 14,380,000</u>	<u>\$ 17,975,000</u>

Note: Part of the transition planning will include an assessment of actual agency cost.